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No. 62

(PART 1 – TEXT & TABLES)

SACLANT ASW
RESEARCH CENTRE

Study of the Oceanography of the Upper Layer in the N.E. Atlantic:

MILOC 64 DATA — PHASE 2

by

A. Dahme

1 NOVEMBER 1965

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VIALE SAN BARTOLOMEO, [illegible]
LA SPEZIA, ITALY

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TECHNICAL REPORT NO. 52

SACLANT ASW RESEARCH CENTRE

Viale San Bartolomeo 92

La Spezia, Italy

STUDY OF THE OCEANOGRAPHY OF THE UPPER LAYER IN THE N.E. ATLANTIC

MILOC 64 DATA – PHASE A

By

A. Dahme

1 November 1965

APPROVED FOR DISTRIBUTION

HENRIK NØDTVEDT

Director

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TABLES

FRONTISPIECE

MARIA PAOLINA G. (SACLANTCEN) collecting oceanographic and meteorological data in the N.E. Atlantic

MILOC 64 - PHASE A

PREFACE TO THE SERIES

Aims

MILOC 64 was carried out in September 1964 in the eastern North Atlantic under the sponsorship of SACLANT. The survey endeavoured to investigate the oceanography of the surface layer to a depth of 300 m and its relation to the prevailing meteorological conditions.

The specific aims of the survey as listed in the Ooeration Plan were:

"(1) To develop a model of the Eastern North Atlantic which can be used for the prediction of environmental conditions in the upper layer of the sea. Hence, those meteorological conditions which determine the boundary conditions at the sea surface have to be taken into account.

(2) To check the accuracy of the input data to the PASWEPS scheme and the correctness of its interpretation."

As rapid changes in time and space were expected to be a dominant feature of the surface layer, it was thought essential to have several ships and aircraft taking synoptic measurements.

The participating forces were:

DALRYMPLE (UK)	- 2 September to 2 October
MARIA PAOLINA G. (SACLANTCEN)	- 2 September to 3 October
H. U SVERDRUP (NO)	- 7 September to 1 October
ORIGNY (FR)	- 17 September to 28 September
JOÃO DE LISBOA (PO)	- 2 September to 7 September

USN Super-Constallation aircraft - 2 September to 13 September
(Fitted with ART and other oceanographic instruments)

RCAF Argus aircraft - 2 September to 13 September
(Fitted with ART and carried meteorologists)

OWS WEATHER REPORTER (JULIET) - 4 September to 27 September

OWS WEATHER MONITOR (JULIET) - 27 September to 1 October

General Conduct of Survey

The selected survey area was 540 nm by 135 nm (Fig. 0.1) extending from Ocean Weather Station KILO to 60 nm north of Ocean Weather Station JULIET. The survey was divided into four phases:

Phase A, consisting of a synoptic survey of the area with bathythermograph (BT), Geomagnetic-Kinetograph (GEK), and Airborne Radiation Thermometer (ART) measurements during the period 2 to 9 September, and similar measurements without the ART from 1 to 3 October.

Phases B and D, consisting of time variation studies based on BT's and oceanographic casts in a restricted area near Ocean Weather Station JULIET, during the periods 9 to 13 September and 27 September to 1 October. During Phase B the aircraft measured sea surface temperatures with the ART over a 120 nm x 150 nm area centred on JULIET.

Phase C, consisting of a classical oceanographic survey using hydrographic casts over an area of 120 x 135 nm centred on JULIET, during the period 22 to 26 September. Casts were taken down to 300 m on a grid spacing of approximately 15 nm.

In addition to the oceanographic casts and the BT and ART measurements mentioned above, measurements were taken of the sound velocity, meteorological elements, bathymetry, solar radiation, sea-surface temperature by bucket, and engine injection temperature.

All oceanographic and meteorological instruments were calibrated by the appropriate National Authorities prior to the survey.

Data Processing

The data in various forms of refinement have been aggregated at the SACLANT ASW Research Centre. Considerable assistance in further refinement and interpretation of the data has been provided by several national commands and activities. Where practicable, computer programmes have been written and the data placed in digital form on magnetic tape, in order to handle the mass of information objectively.

Navigation during MILOC 64 was largely based on dead-reckoning with astro-fixing and occasional assistance from electronic data. All available navigational information was collected at the Centre and master track charts were drawn to a scale of 1:500,000, ref: 50°N. The error of geographical positions on the charts is thought to be of the order of 2-3 nm for ships, but somewhat greater for aircraft. The error of relative positions when forces were in radar contact is thought to be of the order of $\frac{1}{2}$ - 1 nm. These charts showing positions of BTs, casts, and GEKs are available from the Centre on request.

Reports of this Series

The refined data for MILOC 64 is published in the three reports of the present series:

- Technical Report 52 - Phase A
- Technical Report 53 - Phase C
- Technical Report 54 - Phases B and D

These initial reports do not attempt to interpret the data. Concurrent with the production of the above reports, a statistical and oceanographic interpretation of the data is being carried out, and these will be published as Technical Memoranda prior to the publication of final, comprehensive reports.

MILOC 64 PHASE A

ABSTRACT

The refined data collected in September 1964 during part of a joint oceanographic survey (MILOC 64) of the area of the N.E. Atlantic between OWS KILO (45°N, 16°W) and OWS JULIET (52.5°N, 20°W) by five ships and two aircraft are reported.

The data presented in this first report of the series consist of simultaneous bathythermograph and meteorological measurements, a comparison of sea surface temperatures measured by bucket and by airborne radiation thermometers, and GEK measurements of ocean currents.

The collected data are also compared, where applicable, with the information contained in the PASWEPS charts of approximately the same period prepared for NATO naval forces.

ACKNOWLEDGMENTS

Although this report is presented by the author in his position of Scientist-in-Charge of MILOC, it actually represents the combined work of many scientists and officers of SACLANTCEN and is based on the data collected and processed by the staffs of participating countries.

SACLANTCEN wishes to acknowledge the enthusiasm, patience and perseverance of the officers, scientists and crew of the participating ships and aircraft in collecting the data, the invaluable assistance of the National Oceanographic Data Centre, Washington, D.C. in converting the BT data into a form suitable for the computer, and the help rendered by a multitude of other national authorities and agencies at various stages in the work.

1. DETAILED CONDUCT OF PHASE A

DALRYMPLE, JOÃO DE LISBOA and MARIA PAOLINA assembled at Ocean Weather Station KILO on the morning of 2 September 64, and started Phase A at 1300 Z. SVERDRUP joined Phase A after the departure of JOÃO DE LISBOA on 7 September.

During Phase A the ships sailed in line abreast at a distance apart varying between 12 to 15 nm, on a course of 340° or its reciprocal, and at a speed of approximately 8 kt. BT's and bucket temperatures were taken concurrently by each ship at each half hour. The meteorological data — cloud type and amount, dry and wet bulb temperature, air pressure, weather, wind direction and speed, wave height, period and direction, and visibility — were recorded at the same time.

DALRYMPLE, MARIA PAOLINA, and SVERDRUP streamed a GEK throughout Phase A. Each four hours — 0001, 0400, 0800, 1200, 2000Z — a step-aside was carried out according to the following schedule:

zero + 10 min: 90° turn to starboard
zero + 20 min: 90° turn to port to original course
zero + 25 min: 90° turn to port
zero + 35 min: 90° turn to starboard to original course

During this manoeuvre the BT falling on zero + 30 min was not taken.

DALRYMPLE, SVERDRUP and MARIA PAOLINA were equipped with thermographs that read injection temperature continuously. JOÃO DE LISBOA did not have a constantly recording instrument and therefore read the injection temperature half-hourly. DALRYMPLE was fitted with a Lumby Thermometer as an additional instrument to read SST. Solar radiation was continuously measured by DALRYMPLE and MARIA PAOLINA throughout the survey. Soundings were taken by all ships according to national instructions.

OWS WEATHER REPORTER took hourly BTs and daily casts as well as her meteorological observations. WEATHER MONITOR only took twice daily BTs and hourly weather. These data will be included in the reports on Phases B and D.

During Phase A the RCAF and USN aircraft each flew two ART sorties in circumstances favourable to the collection of SST data. Both aircraft recorded meteorological elements either manually or by means of constantly-recording devices. The first three sorties were flown in close coordination with the ships — by flying series of 90 nm legs at right angles to the ships' tracks — to verify the accuracy of the ART and to extend the SST coverage on each side of the ships' tracks. The fourth sortie was an area survey and will be used to develop the larger area SST profiles that are the subject of a separate study.

The total area surveyed in Phase A by ships and aircraft is shown in Fig. 1.1.

Figure 1.2 shows the movement of the ships in Phase A in greater detail. The phase was divided into laps as follows (ships listed from west to east):

Lap 1 - JOÃO DE LISBOA, DALRYMPLE, and MARIA PAOLINA sailed on course 340° through the centre of the area in line abreast, 12-15 nm spacing.

Lap 2 - JOÃO DE LISBOA, DALRYMPLE, and MARIA PAOLINA sailed on course 160° through the western side of the area in line abreast, 12-15 nm spacing.

Lap 3 - MARIA PAOLINA, DALRYMPLE, and SVERDRUP sailed on course 340° through the eastern side of the area in line abreast, 12-15 nm spacing. Prior to the end of Lap 3 SVERDRUP broke off to lay a marker buoy near JULIET for Phase B.

Lap 4 - JOÃO DE LISBOA proceeded south on course 160°.

Lap 5 - DALRYMPLE and MARIA PAOLINA proceeded south on course 160° prior to the termination of the survey.

2. TEMPERATURE STRUCTURE OF THE SURVEY AREA

2.1 Sea Surface Temperature

Tables 2.1 to 2.4 list the SST measured by bucket at the time of each BT dip, together with the time and the number of the BT slide. Tables 2.5 to 2.8 list the position of each BT dip taken from the master track charts.

Graphs of SST measured by bucket against the track of the ships are shown in Figs. 2.1 to 2.12. As the courses were roughly northerly or southerly, only the latitudes — together with the corresponding times (GMT) — are shown along the x-axis.

As expected, there is a general decrease in the SST towards the north; however, the gradient is not constant with latitude and fluctuations outside this general trend are observed. Details will be revealed by a rigorous statistical treatment that is being planned.

No diurnal variation is visible within the given accuracy of the data. The standard deviation of these temperature measurements is thought to be of the order of 0.1°C.

(The variations of SST, but in an east-west direction, will also be seen in Figs. 3.14 to 3.17 of the next chapter. As the mean course was 340°, the average speed 8 kt, and the mean distance apart about 12 nm, there was a differential of approximately $\pm \frac{1}{2}$ hr with regard to the guide (DALRYMPLE) in the times that the ships arrived at a given latitude).

Figures 2.13 to 2.20 demonstrate the difference between the bucket temperature and the temperature measured at the intake of the water that cools the ship's engine. DALRYMPLE and SVERDRUP had continuously recording instruments from which the values were taken at the time of the BT dip. MARIA PAOLINA's instrument was out of action. The average depth of the intake for all three ships was 3 m below the sea surface.

Figures 2.21 to 2.23 show the SST measured by the aircraft's airborne radiation thermometer compared with the SST profile developed by joining each ship's bucket temperatures. The aircraft flew 90 nm legs at right angles to the ships' tracks, passing just ahead of the ship on each cross-over. When the aircraft was directly ahead of the ship the ART temperature trace was marked and, at the same time, a bucket temperature was taken by the ship. The ART temperature as presented is not an instantaneous reading but rather the temperature averaged over 1 minute, i.e. along a track of approximately 3 nm. In some cases the aircraft passed a few miles ahead of a ship (often a measured distance), in which case simultaneous measurements were not in the same body of water. The ships' measurements were interpolated to correspond with the time that the ship was in the same body of water as that previously measured by the aircraft. Therefore the comparative measurements are accurate in space but may vary from zero to 60 min in time. Tables 2.9 to 2.11 list the times at which the aircraft and the ships crossed the common points, together with the temperature measurements and their differences. Table 2.12 is a statistical extract from Figs. 2.21 to 2.23.

The fourth sortie flown in Phase A was a large area survey flown independently of the ships and is not shown in this report. This sortie and the other ART area survey made during Phase B have been used to develop the large area SST profiles and are being published separately, with preliminary scientific interpretation, as Technical Memoranda.

2.2 Sub-Surface Temperature - (between 0 and 270 m)

Prior to an examination of the sub-surface temperature structure it may be useful to examine the manner in which the BT data were handled.

The BT slides were processed according to La Fond*, i.e. the surface temperature of the slide was corrected with regard to a reference temperature. This reference temperature was either the temperature of a bucket sample or the reading of a calibrated and towed Lumby thermometer (DALRYMPLE). The temperature grid correction was made from the average deviation of 20 consecutive samples. The slides and the grid

* La Fond, Processing Oceanographic Data', H O Pub No 614

were then positioned for photographing on 35 mm film after adjustment for the temperature and depth corrections.

These films were used to put the BT data in digital form on magnetic tape. This processing was carried out by the National Oceanographic Data Centre in Washington in accordance with its Publication M-3*. The temperatures were read at fixed depth intervals (5 metres, 10 feet, or 2 fathoms, depending on the units of the BT grid).

It is difficult to judge the absolute accuracy of each BT. The NODC quality code (2) indicated that the digitized temperatures were estimated to be within $\pm$ 1.0°C of the true temperatures. As a standard deviation, this value is probably too high. It is, therefore, assumed that it means that 99% of all data are within $\pm$ 1.0°C, which corresponds to a standard deviation of approximately 0.3°C assuming a normal distribution of the errors. The relative errors between different BT dips are smaller as long as a series of measurements is taken with one instrument.

The errors of the depth measurements recorded on the BT slides is supposed to be of the order of 1% or 2% of the full scale, i.e. 2.7 m to 5.4 m for the 900 ft BT's. A standard deviation of 2 m seems to be an acceptable value.

Table 2.13 indicates how individual BT instruments were changed during Phase A; each letter stands for one instrument, based on the arbitrary notation used by NODC.

The sub-surface temperature profiles are shown at the bottom of Figs. 3.2 to 3.13 of the next chapter, where the temperature distribution from the sea surface down to 270 m is presented in the form of isotherms in steps of 1°C. The figures were drawn directly by the output of an x-y plotter, the input of which was prepared by the computer. After having converted all temperatures to centigrade and all depths to meters, the isotherms

* Manual for Processing Bathythermograph Data Part 1 - Instruction for Manually Digitizing Bathythermograph Data

were calculated by linear interpolation between successive temperatures*.

In addition, Figs. 3.2 to 3.13 also show the sea surface temperature for comparison. There is a slight difference between these graphs and Figs. 2.1 to 2.12; the latter shows the bucket temperatures whereas the traces in Fig. 3.2 to 3.13 are composed of the first temperature of each slide. These latter do not necessarily coincide with the bucket temperatures, because the corrections of the slides are based on the average of 20 measurements, as mentioned above. The surface temperature as measured by BT was deliberately chosen in order not to disturb possible coherence between surface temperature, layer depth and isotherms.

* Details are contained in the Centre's Technical Memorandum No. 104 "An ALGOL Computer Programme for the Display of Layer Depth and Isotherms from a Large Series of BT Records", by N. Bom and J.B. Schipmölder.

3. LAYER DEPTH STRUCTURE OF THE SURVEY AREA

3.1 Definition of Layer Depth

Throughout this report the concept of the "potential layer depth" as described by J.P. Tully* is used.

The "potential layer depth" (abbreviated "layer depth" or LD) is the depth where the seasonal thermocline starts. To prove whether this concept is applicable to the survey area, all BT traces of MARIA PAOLINA were visually inspected. As a result, it was found that all BT traces could be divided into seven different "types", which are listed in Fig. 3.1 and can be described as follows:

Type 1: Isothermal layer above the seasonal thermocline.

2: As type 1, with a negative gradient in the top layer (transient)

3: A slight, constantly negative, temperature gradient above the seasonal thermocline.

4: Two isothermal layers above the seasonal thermocline. The upper layer, called the secondary layer, is warmer than the layer underneath.

5: An isothermal top layer is followed by a layer with a negative temperature gradient. This gradient is considerably smaller than the gradient of the seasonal thermocline.

6: A type in which the mixing effects mask the limits between the seasonal thermocline and the adjacent layer in which there is a smaller temperature gradient.

7: As type 1, but with a positive gradient in the top layer.

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* J P Tully – Assessment of Temperature Structure in the Eastern Subarctic Pacific Ocean Fish Res Board Canada, Man Rep Ser (Ocean and Limn) No 103 November 1961

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The layer depth H_A is an easily distinguishable feature for all types except type 6. In this latter case the depth of the isothermal layer defines the layer depth. Figure 3.1 illustrates that the layer depth H_A is a significant oceanographic feature of the survey area in autumn and is therefore one of the basic parameters which describe the oceanographic conditions and determine the propagation of under water sound and, hence, the range of any sonar equipment. However, it must be emphasized that this statement holds only for the data collected in MILOC 64, i.e. in this particular area at that particular time. No extrapolation in time or space can be made before further extensive investigations have been carried out.

3.2 Calculation of Layer Depth

As the BT temperatures were stored on magnetic tape in increments (d) of either 5 m, 10 ft, or 2 fathoms, a special computer programme has been designed to calculate the layer depth from the stored data. This has been carried out in several steps.

As a basis for reference, layer depths were visually read from MARIA PAOLINA's BT traces collected during Lap 1 according to the definitions given above.

The computer was asked to look for the depth increment i (with temperature T_i) at which the temperature difference $T_{i+1} - T_i$ is smaller than a given value beta (note that beta is negative). The computer then fits a polynom of degree n through the three points $i + \frac{1}{2}$, $i - \frac{1}{2}$, $i - \frac{3}{2}$, and finds the depth where the gradient is equal to beta/d. This depth is rounded off to an integer and represents the layer depth in metres*.

To find the appropriate value of beta and the appropriate degree of the polynom, an empirical approach was chosen. The layer depths computed with several values of beta and with a first, a second, and a third degree polynom were compared with the reference set of visually determined layer depths (MARIA PAOLINA, Lap 1). The criterions of comparison were:

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* For details of program see the Centre's Technical Memo No. 104 by N. Bom and J. B. Sch[illegible]der

(i) the standard deviation of the differences between the computed and the visually determined layer depths.

(ii) the difference between the mean value of the visually determined layer depths and the mean value of the computed layer depths.

That pair of beta and n were chosen which minimizes the values of (i) and (ii) above. These conditions were fulfilled when using beta 0.501 $^{\circ}$C (which, as a constant increment of 5 m was chosen, corresponds to a gradient of −0.1002 $^{\circ}$C/m) and n = 2, i.e. by fitting a parabola through the three points $i + \frac{1}{2}$, $i - \frac{1}{2}$, $i - \frac{3}{2}$.

Hence, the computer defines the layer depth in the following way: "Layer depth is that depth at which the temperature gradient — using a second order interpolation — exceeds for the first time the value −0.1002 $^{\circ}$C/m." This definition is by no means the same definition as given in Para. 3.1. However, it is felt that the layer depth computed in this way is the best approach to the original definition that can be achieved with the available data.

Precautions have been taken to exclude the possibility of mistaking the secondary layer depth in type 4 for the potential layer depth. If the computed layer depth is smaller than or equal to 17 m, it is supposed to be a secondary layer depth and the programme continues to find the potential layer depth.

3.3 Layer Depth Variation Along the Ships' Tracks

The computed layer depths were listed in Tables 2.1 to 2.4. Figures 3.2 to 3.13 show, for the different ships, the layer depths computed from each BT, together with the SST and the temperature profiles. The relative fluctuations are considerably greater than those shown by the SST. A rigorous statistical analysis will be carried out later.

Figures 3.14 to 3.17 illustrate the east-west variations of the layer depth by superimposing the results obtained simultaneously in each Lap by the different ships. However,

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as mentioned in Chapter 2, there was a time differential of about $\pm \frac{1}{2}$ hour between the guide and her neighbours for the same latitude.

Finally, in Figs. 3.18 to 3.21, the layer depths are compared with the corresponding SST (first temperature of the BT). Except in the area just north of OWS KILO there seems to be a correlation between the trend of the layer depth and the trend of the sea surface temperature: layer depth increases with decreasing SST. Again this will be the subject of further investigations using appropriate methods of statistical analysis.

4. SURFACE CURRENTS IN THE SURVEY AREA AS MEASURED BY GEK

DALRYMPLE, MARIA PAOLINA and SVERDRUP streamed a GEK throughout Phase A. Recording and processing were accomplished according to conventional methods, taking the vertical component of the earth's magnetic field H_z from H.O. Chart 1702, 4th edition 1954. For converting the voltage (e, measured in millivolts) into current velocity (v, measured in knots) the following formula was used:

$$v = k \frac{e}{5.15 \, H_z}$$

As no calibration runs for the GEK were carried out, the value $k = 1.1$, as suggested by von Arx* for the open ocean, was chosen.

As already mentioned in Chapter 1, step-aside manoeuvres were carried out every four hour to get the electrode zero and the vector component parallel to the ship's course.

In Figs. 4.1 to 4.4 the continuous records of the component perpendicular to the ship's course, as well as the full vector for each step-aside, are shown together with the average of the wind over a four-hour period. The continuous records of DALRYMPLE and SVERDRUP are omitted, partly because the electrode zero shifted considerably, partly because the records were distorted by slowing down for BT's — thus impeding an exact evaluation outside the step-aside manoeuvres.

A rough interpretation leads to the conclusion that the currents are mainly composed of wind-driven currents and tidal currents. The latter prevail when the winds are weak.

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*W.S. von Arx, "Introduction to Physical Oceanography", 1962, p. 266

5. METEOROLOGICAL AND WAVE DATA COLLECTED DURING THE SURVEY

Table 5.1 indicates the instruments used for meteorological measurements during MILOC 64 and their locations aboard the ships.

Half-hourly measurements of wind speed and wind direction are shown graphically in Figs. 5.1 to 5.10.

The air temperatures (wet and dry bulb) measured every half hour are shown in Figs. 5.11 to 5.22. The differences between air temperature and sea surface temperature are plotted in Figs 5.23 to 5.34; these are useful for a study of the heat transfer between sea and air.

The following figures — Figs. 5.35 to 5.46 — give the evaporation potential. This is defined as the difference $e_w - e_a$, where e_w is the saturation water vapour pressure at the temperature of the sea surface and e_a is the actual water vapour pressure of the air, this latter being proportional to the difference between the dry and wet bulb temperatures measured at a height of several metres above sea level. This evaporation potential is, together with the wind speed, an indicator for the cooling of the sea surface by evaporation.

Table 5.2 and Figs. 5.47 to 5.49 give the solar radiation measurements collected by DALRYMPLE and MARIA PAOLINA. A comparison with the data collected by the JULIET weather ships at the same time indicates that DALRYMPLE's measurements might be too high by 17%. However, as the instrument was calibrated before being installed on DALRYMPLE, and as there is no hint of the time at which calibration changed, the actual recordings are imparted. The registrations of MARIA PAOLINA are not accurate enough to allow an hourly separation. Therefore her records were integrated by a planimeter to get the daily insolations. The maximum relative error of her measurement is estimated to be ± 10%.

Table 5.3 collects the other meteorological elements and the wave parameters measured on board DALRYMPLE. These are representative of the conditions experienced by all the ships and have been chosen because DALRYMPLE carried a special meteorological officer, so that her records can be considered to be more precise.

NATO RESTRICTED MARIA PAOLINA TABLE 5.2

6. ASSESSMENT OF PASWEPS DATA

A secondary aim of MILOC 64 was "to check the accuracy of the input data to the PASWEPS scheme and the correctness of its interpretation." PASWEPS (Pilot ASWEPS) is operated for NATO by MOD (Navy) UK. In order that the PASWEPS system might be subjected to a completely independent assessment, none of the data obtained by the survey vessels was passed to the PASWEPS organization. The only input data received during this period by PASWEPS were from their normal sources i.e. ships on passage and OWS (the usual twice-daily records only, not the special hourly records made by JULIET for MILOC).

For a complete validation of this system to be made with a reasonable order of confidence it would have to include a large number of operational factors as well as scientific measurements made during several oceanographic seasons. The Centre does not intend to carry out an assessment of this magnitude and complexity, but has briefly compared the data provided to operational forces (SST and layer depth) by PASWEPS with measured values taken during a comparable period. As further knowledge of the MILOC waters become available through the continuing analysis of the MILOC 64 data and the surveys of 1965 and 1966, it may be possible to assist the PASWEPS team by determining which features of the ocean have to be measured, how frequently, and with what accuracy, to provide the data necessary for developing SST and layer depth profiles.

Figures 6.1 and 6.2 show the two types of charts distributed by PASWEPS to the operational forces. The first chart shows the sea surface temperature for the period 3-12 September in 1/2°C isotherms, based on input data accumulated by PASWEPS during this same period. The second chart shows the PASWEPS interpretation of layer depth for the period of 13-22 September, based on BTs and SST for the same period. During the period under review, however, the BT input for this area consisted only of data received from the two Ocean Weather Ships. These charts represent the conditions thought to be present during the specified periods and are used as forecasts only in the sense that it is assumed that these oceanographic features do not change very rapidly in gross terms.

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Since the accuracy of the PASWEPS SST chart is directly related to the accuracy of the data provided to PASWEPS, these input data have been compared with values measured during MILOC. All bucket temperatures taken during MILOC (period 2-9 September) which fell within 10 nm of the SST provided to PASWEPS (period 3-12 September) were compared. The differences between these temperatures (according to the geographical distribution) are shown in Fig. 6.3. The same information is contained in Fig. 6.4, which gives the distribution of the differences.

Figure 6.5 shows a comparison between the PASWEPS analysis of SST and the measurements of SST made by bucket during MILOC 64, Phase A. Figures 6.6 and 6.7 show, in two different ways, the comparison between the PASWEPS analysis of layer depth and the measurements made by the ships in MILOC 64, Phase A. The histograms of Figs. 6.5 and 6.7 were both prepared in the same way: each point at which a ship crossed a PASWEPS isotherm (Fig. 6.1) or layer depth isobath (Fig. 6.2) was marked and her nearest measurement (bucket temperature or layer depth, respectively) compared with the indicated SST or layer depth value, the possible difference in geographical positions being considered as insignificant. In Fig. 6.6 the comparison of layer depth is between the values found along the track of the DALRYMPLE (identical with Figs. 3.3, 3.6, and 3.8) and the corresponding PASWEPS analysis (in 15 m bands).

In studying the layer depth comparison in Fig. 6.7 it is seen that the frequencies of the differences between the PASWEPS analysis and the MILOC measurements appear to be normally distributed about a 7 m difference (PASWEPS analysis 7 m deeper than MILOC measurements). However, the MILOC measurements were made in the period 2-9 September, whereas the PASWEPS analysis refers to the period 13-22 September, and this 12 day difference must be taken into account.

Two groups of records indicate that during the period there was in fact a sinking of the order of 7 m in the average layer depth. Firstly, the measurements of OWS JULIET made throughout the month indicate an average sinking of approximately 7 m between the two periods. As the PASWEPS layer depth analysis of the MILOC area was very much dependent on the records received from JULIET, it can be assumed that, if a

PASWEPS analysis of the layer depth had been made for the period 2-9 September, there would have been very little difference between the average layer depth in the PASWEPS charts and the average layer depth found in MILOC 64, Phase A.

Secondly, later measurements made by the MARIA PAOLINA in Lap 5 indicate a sinking of the layer depth from an average of 40 m between 2-9 September to an average of 60 m between 1-3 October. Linearly this represents an average sinking of 8.5 m in 12 days, but it might well be that the sinking was less in the early part of September than it was at the end.

However, although there seems to be good agreement between the average values of the PASWEPS analysis and the MILOC measurements (once the 7 m difference is accounted for) it is observed that the range of the differences between individual comparisons (as shown in Fig. 6.7) is practically as great as the range of the measured values themselves. Thus no firm conclusions can be drawn at this stage of the study.

TABLES

1 LAP	2 DATE/TIME GMT		3 BT SLIDE No.	4 SST BUCKET °C	5 LD m	1 LAP	2 DATE/TIME		3 BT SLIDE No.	4 SST BUCKET °C	LD m
1	02	1330	19	18.5	34	1	03	1430	61	17.6	28
		1400	20	18.4	40			1500	62	17.6	35
		1430	21	18.4	43			1530	63	17.6	35
		1500	22	18.5	43			1600	64	17.6	38
		1530	23	18.4	44			1700	65	17.6	34
		1600	24	18.4	41			1730	66	17.6	41
		1700	25	18.4	40			1800	67	17.6	39
		1730	26	18.4	41			1830	68	17.6	40
		1800	27	18.4	-			1900	69	17.4	41
		1830	28	18.4	23			1930	70	17.3	35
		1900	29	18.3	43			2000	71	17.2	33
		1930	30	18.2	-			2100	72	17.2	34
		2000	31	18.0	38			2130	73	17.2	34
		2100	32	18.1	-			2200	74	17.2	30
		2130	33	17.9	40			2230	75	17.2	32
		2200	34	17.7	35			2300	75A	17.2	-
		2230	35	17.5	34			2330	76	17.1	29
		2300	36	17.4	38		04	0001	77	17.2	33
		2330	37	17.4	39			0100	78	17.0	39
	03	0001	38	17.4	34			0130	79	16.9	39
		0100	39	17.1	35			0200	80	16.9	29
		0130	40	17.5	33			0230	81	16.8	39
		0200	41	17.5	34			0300	82	16.7	38
		0230	42	17.4	34			0330	83	16.7	39
		0300	43	17.7	30			0400	84	16.9	49
		0330	44	17.7	38			0500	85	16.7	44
		0400	45	17.4	24			0700	86	17.0	34
		0500	46	17.4	30			0730	87	16.6	38
		0530	47	17.4	29			0800	88	16.6	39
		0600	48	17.3	29			0900	89	16.5	36
		0630	49	17.2	34			0930	90	16.5	39
		0700	50	17.2	39			1000	91	16.6	39
		0730	51	17.2	30			1030	92	16.5	38
		0800	52	17.2	-			1100	93	16.4	29
		0900	53	17.2	29			1130	94	16.4	39
		0930	54	17.2	33			1200	95	16.3	43
		1000	55	17.1	33			1300	96	16.1	35
		1030	56	17.2	28			1330	97	16.1	36
		1100	57	17.2	26			1400	98	16.3	39
		1130	58	17.2	33			1430	99	16.3	32
		1200	59	17.2	29			1500	100	16.1	31
		1230	60	17.3	-			1530	101	16.0	33

2	3	4	5
04 1600	102	15.8	43
1700	103	16.0	41
1730	104	16.3	38
1800	105	16.0	26
1830	106	16.0	38
1900	107	16.0	40
1930	108	16.0	48
2000	109	15.9	45
2100	110	15.8	54
2130	111	15.6	52
2200	112	15.6	49
2230	113	15.6	43
2300	114	15.5	48
2330	115	15.5	49
05 0001	116	15.5	52
0100	117	15.6	48
0130	118	15.5	52
0200	119	15.5	52
0230	120	15.5	48
0300	121	15.5	48
0330	122	15.5	45
0400	123	15.5	47
0500	124	15.3	48
0530	125	15.2	54
0600	125A	15.2	-
0630	126	15.0	49
0700	127	15.0	59
0730	128	15.1	54
0800	129	15.1	39
0900	130	14.9	42
0930	131	15.0	39
1000	132	14.9	38
1030	133	15.0	46
1100	134	15.1	46
1130	135	15.1	54
1200	136	15.0	-
05 1800	140	15.7	39
1830	141	15.6	43
1900	142	15.6	40
1930	143	15.6	43

1	2	3	4	5
2	05 2000	144	15.6	41
	2100	145	15.4	47
	2130	146	15.5	46
	2200	147	15.5	43
	2230	148	15.5	37
	2300	149	15.6	39
	2330	150	15.6	49
	06 0001	151	15.6	44
	0100	152	15.6	44
	0130	153	15.6	39
	0200	154	15.6	44
	0230	155	15.8	39
	0300	156	16.0	44
	0330	157	16.0	42
	0400	158	15.9	49
	0500	159	15.9	43
	0530	160	15.9	40
	0600	161	15.9	39
	0630	162	15.8	44
	0700	163	15.8	43
	0730	164	15.5	48
	0800	165	15.8	51
	0930	166	15.7	44
	1000	167	15.7	-
	1030	168	15.7	48
	1100	169	15.7	43
	1130	170	16.0	38
	1200	171	16.1	40
	1300	172	16.3	48
	1330	173	16.4	45
	1400	174	16.3	38
	1430	175	16.4	38
	1500	176	16.4	26
	1530	177	16.4	50
	1600	178	16.4	38
	1700	179	16.2	42
	1730	180	16.2	45
	1800	181	16.5	43
	1830	182	16.5	43
	1900	183	16.6	51
	1930	184	16.4	39
	2000	185	16.4	43

JOA DE LISBOA TABLE 2 1(

1	2		3	4	5
2	06	2100	186	16.4	38
		2130	187	16.2	40
		2200	188	16.1	40
		2230	189	16.3	30
		2300	190	16.4	35
		2330	191	16.4	35
	07	0001	192	16.0	36
		0100	193	16.7	38
		0130	194	16.7	39
		0200	195	16.7	47
		0230	196	16.9	38
		0300	197	17.3	34
		0330	198	17.3	32
		0400	199	17.2	39
		0500	200	17.1	32
		0530	201	17.1	30
		0600	202	17.0	35
		0630	203	17.0	44
		0700	204	17.0	36
		0730	205	17.0	41
		0800	206	17.0	28
		0900	207	17.2	38
		0930	208	17.2	38
		1000	209	17.2	34
		1030	210	17.2	37
		1100	211	17.2	34
		1130	212	17.4	-
		1200	213	17.5	24
4	07	2000	222	18.0	35
		2030	223	17.9	35
		2100	224	17.9	44
		2130	225	18.0	38
		2200	226	17.9	39
		2230	227	17.9	33
		2300	228	18.0	36
		2330	229	17.9	30
	08	0001	230	17.8	33
		0030	231	17.8	37
		0100	232	17.6	31
		0130	233	17.6	35
		0200	234	17.7	38
		0230	235	17.7	34
	08	0300	236	18.1	30
		0330	237	18.0	38
		0400	238	17.8	43
		0430	239	17.6	34
		0500	240	17.6	43
		0530	241	17.7	30
		0600	242	17.8	41
		0630	243	17.8	36
		0700	244	17.8	26
		0730	245	17.8	30
		0800	246	18.2	37
		0830	247	18.2	38
		0900	248	18.2	39
		0930	249	18.1	34
		1000	250	18.2	39
		1030	251	18.3	38
		1100	252	18.5	35
		1130	253	18.5	48
		1200	254	18.4	45
		1230	255	18.4	36
		1300	256	18.5	39
		1330	257	18.5	45
		1400	258	18.6	40
		1430	259	18.7	39
		1500	260	19.0	43
		1530	261	19.0	39

DALRYMPLE TABLE 2.2a

1 LAP	2 DATE/TIME GMT		3 BT SLIDE No.	4 SST BUCKET °C	5 LD m	1 LAP	2 DATE/TIME GMT		3 BT SLIDE No.	4 SST BUCKET °C	5 LD m
1	02	1330	26	18.4	48	1	03	1700	68	17.2	43
		1400	27	18.4	42			1730	69	17.1	39
		1430	28	18.4	39			1800	70	17.1	30
		1500	29	18.4	33			1830	71	17.2	37
		1530	30	18.4	32			1900	72	17.3	34
		1605	31	18.4	33			1930	73	17.1	37
		1705	32	18.4	36			2000	74	17.1	36
		1733	33	18.3	45			2100	75	17.3	34
		1900	34	17.8	43			2130	76	17.3	44
		1930	35	17.6	45			2200	77	17.4	34
		2100	36	17.8	40			2230	78	17.4	37
		2140	37	17.8	39			2300	79	17.4	39
		2200	38	17.8	36			2330	80	17.3	37
		2230	39	17.6	44		04	0001	81	17.3	36
		2300	40	17.5	39			0100	82	17.2	33
		2330	41	17.6	41			0130	83	17.3	34
	03	0105	42	17.7	39			0200	84	17.3	37
		0135	43	17.7	38			0230	85	17.2	-
		0230	44	17.4	33			0300	86	17.3	42
		0300	45	17.3	33			0330	87	17.3	-
		0400	46	17.3	37			0400	88	17.4	40
		0500	47	17.2	43			0500	89	17.4	40
		0530	48	17.3	42			0530	90	17.3	44
		0600	49	17.5	33			0600	91	17.3	33
		0630	50	17.3	34			0630	92	17.3	29
		0700	51	17.2	37			0700	93	17.4	24
		0730	52	17.2	45			0730	94	17.2	34
		0900	53	17.1	33			0800	95	17.2	39
		0930	54	17.1	30			0900	96	17.3	36
		1000	55	17.1	39			0930	97	170	36
		1030	56	17.1	34			1000	98	168	36
		1100	57	17.1	31			1030	99	16.8	34
		1130	58	17.1	36			1100	100	16.7	36
		1200	59	17.1	33			1130	101	16.7	33
		1230	60	17.1	33			1200	102	16.4	36
		1300	61	17.1	35			1300	103	16.2	40
		1330	62	17.1	38			1330	104	16.3	33
		1400	63	17.3	33			1400	105	16.1	56
		1430	64	17.3	41			1430	106	16.1	38
		1500	65	17.2	39			1500	107	16.1	43
		1530	66	17.2	42			1530	108	15.9	41
		1600	67	17.1	48			1600	109	16.1	38

NATO RESTRICTED **JOAO DE LISBOA** TABLE 2.5

1	2	3	4	5
1	04 1700	110	16.1	41
	1730	111	16.1	38
	1800	112	16.0	36
	1830	113	15.7	45
	1900	114	15.7	46
	2000	115	15.7	44
	2130	116	15.7	48
	2200	117	15.6	44
	2230	118	15.4	48
	2300	119	15.4	50
	2330	120	15.4	51
	05 0001	121	15.3	51
	0100	122	15.4	49
	0130	123	15.3	46
	0200	124	15.3	47
	0230	125	15.5	48
	0300	126	15.4	53
	0330	127	15.3	42
	0400	128	15.3	43
	0500	129	15.2	39
	0530	130	15.2	42
	0600	131	15.0	41
	0630	132	15.0	45
	0700	133	15.0	52
	0730	134	14.7	48
	0800	135	14.8	57
	0900	136	14.6	46
	1000	137	14.8	58
	1030	138	14.8	57
	1100	139	14.8	50
	1200	140	14.9	54
	1305	141	15.0	51
	1330	142	15.1.	50
2	1730	143	15.0	-
	1800	144	15.5	53
	1830	145	15.3	39
	1900	146	15.4	42
	1930	147	15.4	31
	2000	148	15.4	42
	2100	149	15.3	39
	2130	150	15.2	48
	2200	151	15.2	42
2	05 2230	152	15.2	45
	2300	153	15.3	43
	2330	154	15.3	43
	06 0001	155	15.1	45
	0100	156	15.4	50
	0130	157	15.3	50
	0200	158	15.4	39
	0230	159	15.2	46
	0300	160	15.5	37
	0400	161	15.6	48
	0500	162	15.6	51
	0530	163	15.6	47
	0600	164	15.7	41
	0630	165	15.7	44
	0700	166	15.6	50
	0730	167	15.6	26
	0800	168	15.6	48
	0901	169	15.5	51
	0930	170	15.5	54
	1000	171	15.5	45
	1030	172	15.6	37
	1100	173	15.6	50
	1130	174	15.7	48
	1200	175	15.7	56
	1300	176	15.9	41
	1330	177	16.2	30
	1400	178	16.2	31
	1430	179	16.1	35
	1500	180	16.2	24
	1530	181	16.2	26
	1600	182	16.1	37
	1700	183	16.0	39
	1730	184	16.0	35
	1800	185	15.9	28
	1830	186	16.0	37
	1900	187	16.2	35
	1930	188	16.3	28
	2000	189	16.2	37
	2100	190	16.5	42
	2130	191	16.6	39
	2200	192	16.4	40
	2230	193	16.6	34
	2300	194	16.6	39

NATO RESTRICTED DALRYMPLE TABLE

1		2	3	4	5
2	06	2330	195	16.8	34
	07	0001	196	16.8	30
		0100	197	16.8	35
		0130	198	17.0	33
		0200	199	17.0	32
		0230	200	17.1	42
		0300	201	17.2	40
		0330	202	17.2	42
		0400	203	17.4	37
		0500	204	17.4	41
		0530	205	17.4	39
		0600	206	17.3	33
		0630	207	17.2	27
		0700	208	17.3	57
		0730	209	17.3	38
		0800	210	17.3	31
		0900	211	17.3	28
		0930	212	17.2	32
		1000	213	17.1	37
		1030	214	17.1	47
		1130	215	17.5	31
		1200	216	17.4	37
3		1830	228	17.2	24
		1900	229	17.1	23
		1930	230	17.2	32
		2000	231	17.3	29
		2100	232	17.5	21
		2130	233	17.7	24
		2200	234	17.7	27
		2230	235	17.7	36
		2300	236	17.4	42
		2330	237	17.5	41
		2359	238	17.6	35
	08	0100	239	17.5	36
		0130	240	17.4	39
		0200	241	17.3	34
		0230	242	17.1	41
		0300	243	17.3	26
		0330	244	17.2	38
		0400	245	17.1	42
		0500	246	16.7	38
		0530	247	16.4	43
3	08	0600	248	16.2	43
		0630	249	16.2	28
		0700	250	16.0	35
		0730	251	16.6	24
		0800	252	16.6	36
		0900	253	16.5	40
		0930	254	16.4	34
		1002	255	16.2	44
		1030	256	16.3	38
		1100	257	16.6	25
		1130	258	16.6	26
		1200	259	16.6	43
		1300	260	16.6	55
		1330	261	16.7	37
		1400	262	16.7	40
		1435	263	16.7	44
		1500	264	16.6	38
		1530	265	16.6	38
		1600	266	16.4	34
		1700	267	16.1	36
		1730	268	15.7	31
		1800	269	16.0	24
		1830	270	16.1	49
		1900	271	16.1	28
		1930	272	16.1	35
		2000	273	16.1	34
		2100	274	15.7	41
		2130	275	15.6	30
		2200	276	15.6	39
		2230	277	15.6	28
		2300	278	15.6	40
		2330	279	15.6	42
	09	0001	280	15.5	45
		0100	281	15.5	46
		0130	282	15.5	53
		0200	283	15.0	48
		0300	284	15.3	42
		0330	285	15.2	42
		0400	286	15.5	40
		0500	287	15.5	-
		0530	288	14.9	45
		0600	289	14.8	43
		0630	290	14.8	45

NATO RESTRICTED

DALRYMPLE

TABLE 2.

1	2		3	4	5	1	2	3	4	5
3	09	0700	291	14.9	-					
		0730	292	14.9	50					
		0800	293	14.9	52					
		0900	294	14.9	56					
		0930	295	14.9	50					
		1000	296	14.9	56					
		1030	297	14.8	42					
		1100	298	[illegible]	52					
		1130	299	[illegible]	50					
		1200	300	14.8	66					
	Oct.									
5	01	1400	583	14.9	59					
		1430	584	15.0	53					
		1500	585	14.9	57					
		1530	586	14.7	51					
		1600	587	14.7	57					
		1700	588	15.5	56					
		1730	589	15.7	51					
		1800	590	15.6	51					
		1830	591	15.6	45					
		1900	592	15.6	-					
		1930	593	15.6	52					
		2000	594	15.6	41					
		2100	595	15.7	56					
		2130	596	15.7	61					
		2200	597	15.6	-					
		2230	598	15.6	59					
		2300	599	16.0	47					
		2330	600	16.0	44					
	02	0100	601	15.6	43					
		0130	602	15.7	34					
		0200	603	16.2	36					
		0230	604	16.1	27					
		0300	605	16.1	31					
		0330	606	16.1	51					
		0400	607	16.3	50					
		0500	608	16.2	48					
		0530	609	16.1	45					
		0600	610	16.1	48					
		0630	611	16.1	50					
		0700	612	16.2	51					
		0730	613	16.3	51					
		0800	614	16.5	50					

NATO RESTRICTED DALRYMPLE TABLE

1 LAP	2 DATE/TIME GMT	3 BT SLIDE No.	4 SST BUCKET °C	5 LD m	1 LAP	2 DATE/TIME GMT	3 BT SLIDE No.	4 SST BUCKET °C	5 LD m
1	02 1333	7	18.7	39	1	03 1300	49	17.3	29
	1400	8	18.7	33		1330	50	17.2	28
	1430	9	18.7	39		1400	51	17.4	41
	1500	10	18.7	34		1430	52	17.3	31
	1550	11	18.6	47		1500	53	17.2	34
	1600	12	18.4	44		1530	54	17.3	29
	1700	13	17.9	38		1600	55	17.2	29
	1730	14	17.7	39		1700	56	17.1	28
	1800	15	17.7	40		1730	57	17.1	25
	1830	16	17.7	38		1800	58	17.0	29
	1900	17	17.7	38		1830	59	17.1	27
	1930	18	17.7	39		1900	60	17.1	31
	2000	19	17.7	36		1930	61	17.1	39
	2100	20	17.6	29		2000	62	17.1	33
	2130	21	17.6	39		2100	63	17.2	36
	2200	22	17.4	36		2130	64	17.2	35
	2230	23	17.4	34		2200	65	17.3	38
	2300	24	17.6	39		2230	66	17.3	32
	2330	25	17.5	39		2300	67	17.2	39
	2400	26	17.5	39		2330	68	17.3	34
	03 0[illegible]00	27	17.[illegible]	39		2400	69	17.2	38
	0130	28	17.6	43		04 0100	70	17.3	43
	0200	29	17.6	38		0130	71	17.4	34
	0230	30	17.6	39		0200	72	17.4	33
	0300	31	17.[illegible]	35		0230	73	17.3	38
	0330	32	17.8	38		0300	74	17.3	38
	0400	33	17.9	28		0330	75	17.2	43
	0500	34	17.3	37		0400	76	17.2	38
	0530	35	17.6	35		0500	77	17.2	40
	0600	36	17.6	45		0530	78	17.2	43
	0630	37	17.3	29		0600	79	17.3	35
	07[illegible]	38	17.2	28		0630	80	17.3	34
	0730	39	17.3	29		0700	81	16.9	33
	0800	40	17.2	41		0730	82	17.0	33
	0900	41	17.2	43		0800	83	17.3	29
	0930	42	16.8	38		0900	84	17.1	40
	1000	43	17.1	28		0930	85	17.2	38
	1030	44	17.1	24		1000	86	16.8	44
	1100	45	17.2	24		1030	87	16.8	44
	1130	46	17.2	28		1100	88	16.8	44
	1200	47	17.2	34		1130	89	16.7	42
	1230	48	17.4	31		1200	90	16.8	38

1	2	3	4	5	1	2	3	4	5
1	04 1300	91	16.5	36	2	05 1800	134	15.0	45
	1330	92	16.4	40		1830	135	14.5	44
	1400	93	16.2	48		1900	136	15.0	44
	1430	94	16.3	45		1930	137	15.2	50
	1500	95	16.8	38		2000	138	15.1	44
	1530	96	16.5	38		2100	139	15.2	42
	1600	97	16.6	43		2130	140	15.2	39
	1700	98	16.6	39		2200	141	15.1	43
	1730	99	16.6	39		2230	142	15.2	41
	1800	100	16.5	35		2300	143	15.4	46
	1830	101	16.5	35		2330	144	15.4	44
	1900	102	16.5	19		2400	145	15.3	44
	1930	103	16.4	36		06 0100	146	15.3	54
	2000	104	16.4	35		0130	147	15.4	54
	2100	105	16.3	34		0200	148	15.4	39
	2130	106	16.2	30		0230	149	15.4	39
	2200	107	16.2	-		0300	150	15.4	40
	2230	108	16.[illegible]	36		0330	151	15.4	41
	2300	109	16.2	33		0400	152	15.6	36
	2330	110	16.0	39		0500	153	15.6	43
	2400	111	15.6	35		0530	154	15.6	48
	05 0100	112	15.4	48		0600	155	15.6	49
	0130	113	15.5	50		0630	156	15.5	48
	0200	114	15.4	50		0700	157	15.7	43
	0230	115	15.5	40		0730	158	15.7	50
	0300	116	15.5	49		0800	159	15.6	48
	0330	117	15.4	44		0900	160	15.6	44
	0400	118	15.3	50		0930	161	15.5	47
	0500	119	15.3	72		1000	162	15.6	41
	0530	120	15.3	40		1030	163	15.7	40
	0600	121	15.3	48		1100	164	15.7	44
	0630	122	15.2	51		1130	165	15.9	41
	0700	123	15.0	49		1200	166	15.9	47
	0730	124	14.8	46		1300	167	16.0	45
	0800	125	14.5	49		1330	168	16.0	50
	0900	126	-	-		1400	169	16.1	45
	0930	127	14.8	48		1430	170	16.1	35
	1000	128	14.9	47		1508	171	16.3	33
	1030	129	15.0	51		1530	172	16.2	22
	1100	130	14.9	54		1600	173	16.2	35
	1130	131	14.9	49		1700	174	15.6	33
	1200	132	15.1	48		1730	175	16.9	36

NATO RESTRICTED **MARIA PAOLINA** TABLE

1	2		3	4	5
2	06	1800	176	16.0	40
		1830	177	16.0	43
		1900	178	15.9	50
		1930	179	16.0	48
		2000	180	16.0	35
		2100	181	16.0	33
		2130	182	16.2	43
		2200	183	16.4	34
		2230	184	16.7	39
		2300	185	16.7	38
		2330	186	16.8	39
		2400	187	16.8	45
	07	0100	188	17.0	28
		0130	189	17.1	31
		0200	190	17.0	33
		0230	191	17.3	30
		0300	192	17.3	29
		0330	193	17.3	41
		0400	194	17.3	43
		0500	195	17.3	42
		0537	196	17.4	39
		0600	197	17.3	32
		0630	198	17.4	36
		0700	199	17.5	38
		0742	200	17.4	37
		0800	201	17.6	33
		0900	202	17.7	36
		0930	203	17.5	42
		1000	204	17.6	43
		1030	205	17.6	39
		1100	206	17.6	39
		1130	207	17.7	40
		1200	208	18.0	29
3	07	1730	215	17.6	33
		1800	216	17.5	39
		1830	217	17.6	38
		1900	218	17.6	35
		1930	219	17.6	33
		2000	220	17.6	33
		2100	221	17.8	38
		2130	222	17.8	34
		2200	223	17.8	33
3	07	2230	224	17.7	39
		2300	225	17.6	38
		2330	226	17.7	38
		2400	227	17.6	38
	08	0100	228	17.5	39
		0130	229	17.5	39
		0200	230	17.5	36
		0230	231	17.5	29
		0300	232	17.3	34
		0330	233	17.1	38
		0400	234	17.0	34
		0500	235	17.0	39
		0530	236	16.9	35
		0600	237	16.5	38
		0630	238	16.4	35
		0700	239	16.5	34
		0730	240	16.5	49
		0800	241	16.5	44
		0900	242	16.6	44
		0930	243	16.6	38
		1000	244	16.6	43
		1030	245	16.5	48
		1100	246	16.7	26
		1130	247	16.5	44
		1200	248	16.5	33
		1300	249	16.7	43
		1330	250	16.6	38
		1400	251	16.7	31
		1430	252	16.7	39
		1500	253	16.7	43
		1530	254	16.7	39
		1600	255	16.6	40
		1700	256	16.4	34
		1730	257	16.6	34
		1800	258	16.4	48
		1830	259	16.4	39
		1900	260	16.3	39
		1930	261	15.8	38
		2000	262	15.7	40
		2100	263	15.7	43
		2130	264	15.4	47
		2200	265	15.6	39
		2230	266	15.6	4[illegible]

NATO RESTRICTED MARIA PAOLINA TABLE

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1	2	3	4	5	1	2	3	4	5
3	08 2300	267	15.6	43	5	01 2330	557	15.1	68
	2330	268	15.5	49		02 0001	558	15.4	65
	2400	269	15.5	48		0100	559	15.4	64
	09 0100	270	15.4	43		0130	560	15.8	58
	0130	271	15.4	45		0200	561	15.6	61
	0200	272	15.4	47		0230	562	15.7	54
	0230	273	15.4	39		0300	563	15.6	60
	0300	274	15.4	37		0330	564	15.6	66
	0330	275	15.3	39		0400	565	15.7	66
	0400	276	15.1	27		0500	566	15.6	58
	0500	277	15.0	44		0530	567	15.5	49
	0530	278	14.8	49		0600	568	15.6	49
	0600	279	14.8	50		0630	569	15.9	54
	0630	280	14.8	44		0700	570	15.7	55
	0700	281	14.8	54		0730	571	16.0	48
	0730	282	14.9	53		0800	572	15.7	60
	0800	283	14.8	43		0900	573	15.8	62
	0900	284	14.8	48		0930	574	15.8	63
	0930	285	14.8	49		1000	575	15.7	63
	1000	286	14.8	59		1030	576	16.0	66
	1030	287	14.8	51		1100	577	16.1	65
	1100	288	14.8	44		1130	578	16.3	58
	1130	289	14.9	59		1200	579	16.3	58
	1200	290	15.5	44		1300	580	16.3	54
						1330	581	16.4	49
	Oct.					1400	582	16.3	55
5	01 1400	540	14.8	71		1430	583	16.4	54
	1430	541	14.8	-		1500	584	16.3	58
	1500	542	15.1	64		1530	585	16.2	59
	1530	543	14.9	74		1600	586	16.2	52
	1600	544	14.8	64		1700	587	16.2	68
	1700	545	14.6	65		1730	588	16.1	56
	1730	546	14.7	68		1800	589	16.0	59
	1800	547	14.6	79		1830	590	16.0	59
	1830	548	15.5	71		1900	591	16.0	59
	1900	549	15.5	68		1930	592	16.1	70
	1930	550	15.5	60		2000	593	16.0	60
	2000	551	15.3	64		2100	594	16.4	59
	2100	552	15.5	68		2130	595	16.3	52
	2130	553	15.5	65		2200	596	16.3	58
	2200	554	15.6	75		2230	597	16.4	58
	2230	555	15.6	59		2300	598	16.5	64
	2300	556	15.5	59		2330	599	16.4	59

NATO RESTRICTED

MARIA PAOLINA

TABLE

1		2	3	4	5	1	2	3	4
5	03	0001	600	16.5	56				
		0100	601	16.4	55				
		0130	602	16.6	64				
		0200	603	16.5	58				
		0230	604	16.5	55				
		0300	605	16.4	59				
		0330	606	16.5	50				
		0400	607	16.6	68				
		0500	608	16.6	51				
		0530	609	16.4	59				
		0600	610	16.4	59				
		0630	611	16.3	63				
		0700	612	16.3	54				
		0730	613	16.4	59				
		0800	614	16.4	55				
		0900	615	16.4	58				
		0930	616	16.4	58				
		1000	617	16.4	44				
		1030	618	16.4	50				
		1100	619	16.4	55				
		1130	620	16.4	51				
		1200	621	16.4	45				

NATO RESTRICTED MARIA PAOLINA TABLE 2.7

1 LAP	2 DATE/TIME GMT	3 BT SLIDE No.	4 SST BUCKET °C	5 LD m	1 LAP	2 DATE/TIME GMT	3 BT SLIDE No.	4 SST BUCKET °C
3	08 0800	12	16.6	25				
	0900	13	16.6	28				
	0930	14	16.6	35				
	1000	15	17.0	27				
	1030	16	16.8	39				
	1100	17	16.8	41				
	1130	18	16.8	34				
	1200	19	16.7	33				
	1300	20	16.8	42				
	1330	21	16.7	45				
	1400	22	16.6	39				
	1430	23	16.4	43				
	1500	24	16.0	34				
	1530	25	16.0	35				
	1600	26	16.2	42				
	1700	27	16.3	48				
	1730	28	15.9	19				
	1800	29	16.0	41				
	1830	30	15.9	40				
	1900	31	16.0	34				
	1930	32	15.9	54				
	2000	33	16.1	27				
	2100	34	16.0	47				
	2130	35	16.0	40				
	2200	36	15.9	36				
	2230	37	16.0	35				
	2300	38	16.1	22				
	2330	39	16.0	23				
	09 0001	40	15.7	33				
	0100	41	15.6	31				
	0130	42	15.6	46				
	0200	43	15.6	25				
	0230	44	15.5	41				
	0300	45	15.5	41				
	0330	46	15.5	47				
	0400	47	15.5	39				
	0500	48	15.3	53				
	0530	49	15.1	56				
	0600	50	15.0	54				

BT.No.	POSITION Latitude °N	Longitude °W	BT.No.	POSITION Latitude °N	Longitude °W
19	4521	1618	60	4743	1740
20	4524	1621	61	4756	1748
21	4528	1623	62	4760	1750
22	4531	1625	63	4803	1751
23	4535	1627	64	4807	1753
24	4537	1629	65	4814	1757
25	4545	1633	66	4817	1759
26	4548	1636	67	4820	1801
27	4553	1638	68	4824	1803
28	4556	1639	69	4828	1805
29	4559	1642	70	4831	1807
30	4602	1643	71	4834	1808
31	4606	1645	72	4840	1812
32	4611	1649	73	4843	1813
33	4614	1651	74	4846	1815
34	4617	1653	75	4849	1816
35	4620	1654	75A	4853	1818
36	4623	1656	76	4856	1819
37	4627	1658	77	4859	1821
38	4629	1700	78	4909	1826
39	4635	1704	79	4913	1828
40	4639	1706	80	4917	1829
41	4642	1708	81	4921	1831
42	4646	1709	82	4925	1834
43	4649	1711	83	4929	1835
44	4653	1713	84	4933	1837
45	4655	1714	85	4941	1841
46	4702	1718	86	4955	1848
47	4705	1720	87	4959	1850
48	4708	1722	88	5003	1852
49	4712	1723	89	5008	1855
50	4715	1725	90	5012	1857
51	4718	1727	91	5015	1859
52	4721	1729	92	5019	1901
53	4726	1731	93	5023	1902
54	4729	1733	94	5027	1905
55	4732	1734	95	5031	1907
56	4735	1735	96	5037	1910
57	4737	1737	97	5041	1912
58	4739	1738	98	5045	1914
59	4741	1739	99	5048	1916

BT No.	POSITION Latitude °N	POSITION Longitude °W	BT.No.	POSITION Latitude °N	POSITION Longitude °W
100	5052	1919	143	5303	2119
101	5056	1921	144	5301	2117
102	5958	1922	145	5253	2112
103	5104	1926	146	5250	2110
104	5108	1929	147	5247	2107
105	5111	1931	148	5244	2105
106	5115	1933	149	5241	2103
107	5118	1935	150	5238	2101
108	5122	1937	151	5235	2058
109	5125	1939	152	5229	2054
110	5132	1944	153	5226	2051
111	5135	1945	154	5223	2049
112	5138	1948	155	5219	2046
113	5142	1950	156	5217	2044
114	5147	1953	157	5214	2042
115	5151	1956	158	5212	2040
116	5155	1958	159	5205	2037
117	5201	2002	160	5201	2035
118	5204	2004	161	5157	2033
119	5207	2006	162	5155	2031
120	5210	2008	163	5152	2029
121	5213	2010	164	5148	2027
122	5217	2012	165	5144	2026
123	5220	2014	166	5135	2018
124	5228	2019	167	5132	2016
125	5233	2022	168	5128	2013
125A	5237	2025	169	5125	2011
126	5241	2027	170	5121	2007
127	5245	2030	171	5117	2005
128	5248	2032	172	5112	2001
129	5252	2035	173	5109	1959
130	5259	2037	174	5107	1957
131	5302	2038	175	5104	1955
132	5305	2040	176	5101	1953
133	5309	2041	177	5058	1950
134	5313	2043	178	5055	1949
135	5317	2044	179	5051	1946
136	5320	2046	180	5049	1944
140	5314	2127	181	5047	1942
141	5310	2123	182	5044	1941
142	5307	2121	183	5041	1339

BT.No.	POSITION Latitude °N	Longitude °W
184	5037	1936
185	5034	1934
186	5028	1929
187	5025	1927
188	5022	1925
189	5018	1923
190	5015	1921
191	5012	1920
192	5010	1918
193	5004	1914
194	5001	1912
195	4958	1910
196	4954	1908
197	4950	1905
198	4947	1903
199	4943	1901
200	4938	1857
201	4934	1855
202	4930	1853
203	4927	1850
204	4923	1848
205	4920	1846
206	4916	1843
207	4909	1839
208	4906	1837
209	4902	1835
210	4859	1833
211	4856	1832
212	4853	1830
213	4851	1828
222	4820	1743
223	4816	1741
224	4812	1738
225	4808	1735
226	4804	1733
227	4800	1731
228	4756	1728
229	4752	1726
230	4748	1723
231	4744	1721
232	4740	1719
233	4736	1716
234	4732	1714
235	4728	1711
236	4724	1709
237	4720	1706
238	4716	1704
239	4711	1701
240	4707	1659
241	4703	1656
242	4659	1654
243	4655	1651
244	4651	1649
245	4647	1647
246	4642	1644
247	4638	1641
248	4634	1639
249	4630	1638
250	4626	1636
251	4622	1633
252	4619	1631
253	4615	1628
254	4612	1625
255	4608	1623
256	4605	1620
257	4601	1618
258	4556	1615
259	4552	1613
260	4548	1611
261	4543	1608

BT.No.	POSITION Latitude °N	Longitude °W	BT.No.	POSITION Latitude °N	Longitude °W
26	4525	1603	68	4815	1739
27	4528	1605	69	4819	1741
28	4532	1607	70	4822	1743
29	4535	1610	71	4827	1745
30	4540	1612	72	4831	1747
31	4544	1615	73	4835	1749
32	4550	1618	74	4839	1751
33	4553	1621	75	4845	1754
34	4604	1627	76	4848	1756
35	4607	1629	77	4852	1758
36	4615	1634	78	4856	1760
37	4619	1636	79	4859	1802
38	4622	1638	80	4902	1803
39	4625	1640	81	4906	1805
40	4629	1642	82	4912	1808
41	4632	1645	83	4916	1810
42	4640	1649	84	4920	1812
43	4644	1651	85	4924	1814
44	4651	1654	86	4928	1816
45	4655	1656	87	4932	1818
46	4702	1700	88	4936	1820
47	4707	1702	89	4942	1822
48	4710	1704	90	4946	1824
49	4714	1706	91	4950	1826
50	4717	1707	92	4954	1828
51	4720	1709	93	4958	1830
52	4723	1710	94	5002	1832
53	4730	1714	95	5005	1834
54	4733	1716	96	5010	1836
55	4735	1717	97	5014	1838
56	4738	1719	98	5018	1840
57	4740	1720	99	5022	1842
58	4742	1721	100	5026	1844
59	4744	1723	101	5030	1847
60	4747	1724	102	5034	1849
61	4750	1725	103	5040	1852
62	4752	1727	104	5044	1854
63	4755	1729	105	5047	1856
64	4759	1731	106	5051	1858
65	4803	1733	107	5055	1901
66	4806	1735	108	5058	1904
67	4810	1737	109	5102	1906

BT.No.	POSITION Latitude °N	Longitude °W	BT.No.	POSITION Latitude °N	Longitude °W
110	5107	1909	152	5248	2051
111	5111	1911	153	5245	2049
112	5115	1913	154	5242	2047
113	5118	1916	155	5238	2044
114	5122	1918	156	5234	2041
115	5130	1923	157	5231	2039
116	5139	1929	158	5227	2037
117	5142	1931	159	5223	2034
118	5147	1934	160	5220	2032
119	5151	1936	161	5214	2027
120	5155	1939	162	5209	2024
121	5159	1942	163	5206	2022
122	5204	1945	164	5202	2019
123	5207	1947	165	5159	2017
124	5210	1949	166	5155	2014
125	5214	1952	167	5152	2012
126	5217	1954	168	5149	2010
127	5221	1957	169	5143	2006
128	5225	1959	170	5140	2003
129	5231	2004	171	5136	2000
130	5235	2006	172	5132	1958
131	5239	2009	173	5128	1955
132	5243	2012	174	5125	1953
133	5247	2014	175	5121	1950
134	5250	2017	176	5116	1947
135	5255	2020	177	5113	1944
136	5301	2022	178	5110	1942
137	5508	2024	179	5108	1940
138	5311	2026	180	5105	1939
139	5314	2027	181	5102	1937
140	5321	2030	182	5059	1935
141	5327	2032	183	5055	1932
142	5331	2034	184	5052	1930
143	5317	2113	185	5048	1928
144	5317	2113	186	5046	1926
145	5313	2110	187	5043	1924
146	5310	2107	188	5040	1922
147	5306	2105	189	5037	1920
148	5303	2102	190	5032	1917
149	5258	2058	191	5029	1915
150	5254	2056	192	5026	1912
151	5251	2053	193	5023	1911

NATO RESTRICTED

BT.No.	POSITION Latitude °N	Longitude °W	BT.No.	POSITION Latitude °N	Longitude °W
194	5020	1908	237	4953	1740
195	5016	1906	238	4956	1742
196	5012	1903	239	5002	1744
197	5008	1900	240	5006	1746
198	5005	1857	241	5009	1747
199	5001	1855	242	5013	1749
200	4956	1852	243	5017	1750
201	4952	1849	244	5021	1752
202	4949	1847	245	5025	1753
203	4946	1845	246	5030	1755
204	4941	1842	247	5033	1757
205	4937	1839	248	5037	1759
206	4934	1837	249	5040	1800
207	4930	1835	250	5044	1802
208	4927	1833	251	5048	1803
209	4924	1830	252	5052	1805
210	4920	1828	253	5056	1808
211	4914	1824	254	5100	1810
212	4910	1822	255	5103	1813
213	4907	1821	256	5106	1815
214	4904	1820	257	5109	1817
215	4857	1817	258	5113	1820
216	4854	1815	259	5116	1822
217	4854	1810	260	5120	1825
218	4855	1805	261	5124	1828
219	4856	1800	262	5127	1830
220	4857	1758	263	5130	1832
221	4859	1751	264	5133	1835
222	4902	1739	265	5136	1837
223	4903	1734	266	5140	1840
224	4905	1730	267	5145	1843
225	4906	1724	268	5148	1846
226	4908	1723	269	5151	1849
227	4912	1725	270	5155	1850
228	4916	1726	271	5159	1852
229	4920	1728	272	5203	1854
230	4924	1729	273	5206	1855
231	4927	1730	274	5211	1853
232	4933	1733	275	5214	1900
233	4936	1734	276	5218	1901
234	4940	1736	277	5221	1903
235	4945	1738	278	5225	1905
236	4949	1740	279	5228	1906

BT.No.	POSITION Latitude °N	POSITION Longitude °W
280	[illegible]	1908
281	5236	1911
282	5240	1912
283	5243	1914
284	5250	1917
285	5253	1919
286	5257	1921
287	5301	1923
288	5305	1925
289	5308	1927
290	5312	1929
291	5316	1931
292	5319	1933
293	5323	1935
294	5328	1937
295	5332	1939
296	5335	[illegible]
297	5339	1943
298	5342	1944
299	5345	1946
300	[illegible]	1948
583	[illegible]	1926
584	5218	1022
585	5214	1920
586	5211	[illegible]
587	5207	1916
588	[illegible]	1913
589	5159	1910
590	5156	1908
591	5153	1906
592	5150	1904
593	5146	1902
594	5143	1900
595	5139	1558
596	5136	1856
597	5133	1855
598	5131	1853
599	5128	1851
600	5125	1850
601	5119	1845
602	5115	1843
603	5113	1841
604	5109	1840
605	5107	1838
606	5104	1836
607	5101	1834
608	5057	1832
609	5053	1830
610	5051	1828
611	5047	1826
612	5045	1824
613	5041	1823
614	5038	1821

BT.No.	POSITION Latitude °N	Longitude °W	BT.No.	POSITION Latitude °N	Longitude °W
7	4529	1538	49	4801	1711
8	4531	1540	50	4804	1713
9	4535	1543	51	4807	1714
10	4539	1545	52	4809	1716
11	454	1547	53	4811	1717
12	4547	1550	54	4814	1718
13	4553	1554	55	4817	1719
14	4557	1556	56	4820	1721
15	4600	1558	57	4823	1722
16	4604	1601	58	4826	1724
17	4607	1603	59	4829	1725
18	4611	1605	60	4833	1727
19	4614	1607	61	4836	1728
20	4620	1610	62	4839	1730
21	4622	1613	63	4846	1733
22	4625	1614	64	4850	1735
23	4629	1617	65	4854	1737
24	4632	1618	66	4858	1739
25	4636	1621	67	4902	1740
26	4639	1623	68	4905	1742
27	4645	1626	69	4909	1744
28	4648	1628	70	4914	1746
29	4652	1630	71	4918	1748
30	4656	1633	72	4921	1750
31	4700	1635	73	4925	1751
32	4704	1638	74	4929	1753
33	4708	1640	75	4933	1755
34	4713	1643	76	4937	1757
35	4716	1645	77	4944	1800
36	4719	1647	78	4947	1801
37	4722	1649	79	4952	1803
38	4725	1650	80	4956	1805
39	4729	1653	81	4959	1807
40	4732	1654	82	5003	1809
41	4737	1657	83	5007	1811
42	4739	1659	84	5012	1813
43	4743	1701	85	5015	1815
44	4745	1703	86	5019	1816
45	4749	1704	87	5023	1819
46	4752	1706	88	5027	1820
47	4756	1709	89	5031	1822
48	4759	1710	90	5035	1824

BT.No.	POSITION Latitude °N	Longitude °W	BT.No.	POSITION Latitude °N	Longitude °W
91	5042	1828	135	5318	2049
92	5045	1831	136	5315	2047
93	5049	1832	137	5311	2045
94	5053	1835	138	5309	2043
95	5057	1837	139	5303	2039
96	5100	1840	140	5259	2037
97	5104	1842	141	5255	2034
98	5110	1846	142	5251	2031
99	5113	1848	143	5248	2029
100	5117	1850	144	5244	2027
101	5121	1852	145	5241	2024
102	5125	1855	146	5236	2021
103	5128	1857	147	5232	2019
104	5132	1859	148	5229	2016
105	5137	1902	149	5225	2013
106	5141	1905	150	5221	2011
107	5145	1907	151	5219	2009
108	5149	1910	152	5215	2007
109	5153	1912	153	5210	2003
110	5157	1915	154	5208	2001
111	5202	1918	155	5205	1959
112	5205	1920	156	5203	1957
113	5209	1922	157	5159	1956
114	5213	1925	158	5156	1953
115	5216	1927	159	5152	1951
116	5220	1929	160	5148	1947
117	5224	1931	161	5144	1944
118	5228	1934	162	5141	1941
119	5235	1938	163	5137	1938
120	5239	1940	164	5133	1935
121	5242	1943	165	5129	1933
122	5246	1945	166	5125	1930
123	5250	1947	167	5120	1927
124	5254	1950	168	5115	1925
125	5258	1953	169	5112	1923
126	5303	1956	170	5109	1921
127	5306	1959	171	5106	1920
128	5310	2002	172	5102	1918
129	5314	2005	173	5059	1916
130	5318	2009	174	5056	1913
131	5321	2012	175	5054	1911
132	5325	2015	176	5052	1909
134	5321	2051	177	5050	1907

BT.No.	POSITION Latitude °N	Longitude °W	BT.No.	POSITION Latitude °N	Longitude °W
178	5047	1904	227	4951	1801
179	5044	1902	228	4956	1803
180	5041	1900	229	4960	1805
181	5030	1857	230	5004	1806
182	5033	1855	231	5007	1808
183	5930	1853	232	5011	1810
184	5026	1850	233	5015	1811
185	5023	1848	234	5019	1813
186	5021	1846	235	5024	1815
187	5017	1843	236	5028	1817
188	5011	1839	237	5032	1818
189	5007	1837	238	5036	1820
190	5004	1835	239	5039	1822
191	5001	1833	240	5043	1823
192	4957	1831	241	5047	1825
193	4954	1829	242	5052	1827
194	4950	1827	243	5956	1828
195	4945	1824	244	5059	1830
196	4942	1822	245	5102	1831
197	4939	1820	246	5105	1832
198	4935	1818	247	5109	1833
199	4932	1817	248	5112	1835
200	4928	1814	249	5117	1839
201	4925	1811	250	5120	1842
202	4919	1807	251	5123	1844
203	4915	1805	252	5127	1847
204	4913	1803	253	5130	1849
205	4910	1803	254	5133	1852
206	4906	1801	255	5136	1854
207	4902	1800	256	5141	1859
208	4858	1757	257	5145	1902
215	4908	1739	258	5148	1905
216	4911	1741	259	5152	1908
217	4914	1743	260	5155	1910
218	4917	1745	261	5159	1914
219	4919	1747	262	5202	1915
220	4923	1750	263	5208	1918
221	4929	1753	264	5211	1920
222	4933	1754	265	5214	1921
223	4936	1755	266	5217	1923
224	4940	1757	267	5220	1925
225	4943	1758	268	5223	1926
226	4947	1800	269	5226	1928

BT.No.	POSITION Latitude °N	Longitude °W	BT.No.	POSITION Latitude °N	Longitude °W
270	5231	1931	561	5106	1902
271	5235	1932	562	5103	1901
272	5239	1934	563	5101	1859
273	5242	1935	564	5057	1857
274	5245	1938	565	5054	1856
275	5249	1939	566	5050	1854
276	5253	1942	567	5047	1852
277	5257	1943	568	5045	1850
278	5300	1945	569	5042	1848
279	5303	1947	570	5039	1846
280	5307	1949	571	5036	1844
281	5311	1952	572	5034	1842
282	5315	1954	573	5031	1840
283	5319	1956	574	5028	1839
284	5324	1959	575	5025	1837
285	5328	2001	576	5022	1836
286	5332	2003	577	5019	1834
287	5335	2005	578	5016	1832
288	5339	2007	579	5913	1830
289	5342	2009	580	5009	1828
290	5346	2011	581	5007	1827
540	5215	1946	582	5005	1825
541	5211	1944	583	5002	1823
542	5207	1941	584	4959	1822
543	5203	1940	585	4956	1820
544	5200	1938	586	4953	1818
545	5156	1936	587	4950	1817
546	5152	1934	588	4946	1815
547	5149	1933	589	4944	1813
548	5146	1931	590	4941	1811
549	5143	1930	591	4938	1809
550	5140	1927	592	4935	1808
551	5138	1925	593	4931	1806
552	5134	1921	594	4927	1803
553	5131	1919	595	4924	1802
554	5128	1917	596	4920	1800
555	5125	1915	597	4917	1758
556	5121	1913	598	4913	1756
557	5118	1911	599	4910	1754
558	5115	1908	600	4906	1752
559	5112	1906	601	4902	1749
560	5108	1904	602	4858	1747

ST.No.	POSITION Latitude °N	Longitude °W	ST.No.	POSITION Latitude °N	Longitude °W
603	4855	1745			
604	4851	1743			
605	4848	1741			
606	4844	1739			
607	4841	1737			
608	4836	1734			
609	4833	1732			
610	4830	1730			
611	4826	1729			
612	4823	1727			
613	4820	1725			
614	4817	1723			
615	4814	1721			
616	4811	1720			
617	4808	1718			
618	4806	1717			
619	4804	1716			
620	4802	1715			
621	4800	1713			

BT.No.	POSITION Latitude °N	Longitude °W	BT.No.	POSITION Latitude °N	Longitude °W
12	5101	1747			
13	5107	1750			
14	5111	1752			
15	5114	1755			
16	5117	1759			
17	5120	1802			
18	5123	1804			
19	5126	1807			
20	5131	1811			
21	5134	1813			
22	5137	1815			
23	5140	1817			
24	5143	1820			
25	5145	1822			
26	5148	1824			
27	5153	1828			
28	5156	1830			
29	5200	1833			
30	5203	1835			
31	5207	1838			
32	5210	1840			
33	5213	1842			
34	5218	1843			
35	5220	1843			
36	5223	1844			
37	5226	1845			
38	5229	1847			
39	5232	1849			
40	5235	1851			
41	5239	1853			
42	5243	1855			
43	5246	1857			
44	5250	1859			
45	5253	1901			
46	5256	1902			
47	5300	1904			
48	5305	1907			
49	5308	1909			
50	5311	1911			

US AIRCRAFT

ART - BUCKET COMPARISONS
2 September 1964

TABLE 2.9

A/C time at common point	ART Temp.	Interpolated Bucket Temp.	Diff. ART-B	Ship	Ship time at common point
1358	19.0	18.4	+.6	D	1402
1419	19.0	18.68	+.32	M	1449
1425	19.0	18.4	+.6	D	1427
1430	18.9	18.4	+.5	J	1432
1449	18.8	18.5	+.3	J	1511
1452	18.8	18.42	+.38	D	1514
1457	18.9	18.6	+.3	M	1519
1517	18.5	18.38	+.12	M	1554
1523	18.6	18.4	+.2	D	1534
1528	18.7	18.4	+.3	J	1543
1550	18.6	18.48	+.12	D	1551
1555	18.2	18.07	+.13	M	1637
1610	17.9	17.9	0	M	1705
1615	18.6	18.43	+.17	D	1636
1622	18.4	18.33	+.07	J	1650
1645	18.3	18.39	-.09	J	1652
1648	18.2	18.41	-.21	D	1655
1653	17.7	17.87	-.17	M	1708
1709	17.8	17.7	+.1	M	1735
1715	18.5	18.5	0	D	1717
1719	18.5	18.4	+.1	J	1726
1841	18.6	18.32	+.28	J	1848
1845	18.1	17.8	+.3	D	1852
1849	18.0	17.71	+.29	M	1911
1909	17.7	17.66	+.04	M	1939
1914	18.0	17.8	+.2	D	1916
1918	18.1	18.16	-.06	J	1933
1945	18.4	18.0	+.4	J	2000
1949	17.8	17.6	+.2	D	1956
1953	17.9	17.66	+.24	M	2035
2017	18.1	17.63	+.47	M	2105
2048	18.2	18.0	+.2	J	2110
2051	17.6	17.81	-.2	D	2058
2055	17.7	17.6	+.1	M	2117
2115	17.4	17.4	0	M	2152
2122	17.5	17.8	-.3	D	2129
2126	17.6	17.7	-.1	J	2156
2151	17.5	17.7	-.2	J	2158
2153	17.5	17.8	-.3	D	2142
2158	17.5	17.3	+.2	M	2209

ART - BUCKET COMPARISONS
3 September 1964

CANADIAN AIRCRAFT

A/C time at common point	ART Temp.	Interpolated Bucket Temp.	Diff. ART-B	Ship	Ship time at common point
1448	17.4	17.3	+.1	D	1452
1451	17.3	17.24	+.06	M	1455
1512	17.0	17.26	-.26	M	1516
1517	17.0	17.2	-.2	D	1521
1520	17.2	17.6	-.4	J	1524
1541	16.6	17.45	-.85	J	1545
1610	17.3	17.15	+.15	M	1635
1621	17.2	17.15	+.05	D	1639
1624	17.5	17.9	-.4	J	1639
1644	17.3	17.9	-.6	J	1648
1647	17.2	17.2	0	D	1651
1716	17.0	17.15	-.15	D	1720
1735	17.0	17.6	-.6	J	1739
1742	17.0	17.0	0	D	1746
1746	16.8	17.08	-.28	M	1750
1806	16.7	17.05	-.35	M	1810
1812	16.6	17.1	-.5	D	1816
1816	17.3	17.6	-.3	J	1820
1829	17.1	17.56	-.46	J	1833
1833	16.9	17.25	-.35	D	1837
1838	16.8	17.1	-.3	M	1842
1859	16.7	17.12	-.42	M	1903
1905	16.9	17.26	-.36	D	1903
1909	16.9	17.3	-.4	J	1913
1924	16.9	17.3	-.4	J	1927
1929	16.7	17.1	-.4	D	1933
1935	16.9	17.1	-.2	M	1939

ART - BUCKET COMPARISONS
4 September 1964

US AIRCRAFT

A/C time at common point	ART Temp.	Interpolated Bucket Temp.	Diff. ART-B	Ship	Ship time at common point
1056	16.4	16.7	-.3	D	1100
1100	16.3	16.4	-.1	J	1104
1123	16.4	16.4	0	J	1127
1126	16.5	16.7	-.2	D	1130
1131	16.4	16.75	-.35	M	1135
1153	16.5	16.76	-.26	M	1155
1158	16.4	16.4	0	D	1202
1202	16.4	16.3	+.1	J	1208
1225	16.2	16.18	+.02	J	1239
1233	16.5	16.7	-0.2	M	1237
1257	16.4	16.5	-.1	M	1259
1302	16.1	16.25	-.15	D	1304
1307	16.1	16.1	0	J	1309
1328	16.1	16.1	0	J	1330
1333	16.1	16.3	-.2	D	1333
1337	15.9	16.2	-.3	M	1339
1400	15.8	16.2	-.4	M	1402
1406	15.7	16.1	-.4	D	1408
1410	16.2	16.3	-.1	J	1412
1431	15.8	16.2	-.4	J	1440
1434	15.8	16.05	-.25	D	1440
1440	16.0	16.58	-.58	M	1517
1505	16.2	16.57	-.37	M	1507
1511	15.7	16.0	-.3	D	1513
1514	15.7	16.0	-.3	J	1516
1537	15.5	15.9	-.4	J	1539
1541	15.6	15.9	-.3	D	1543
1546	16.1	16.6	-.5	M	1601
1611	16.0	16.65	-.65	M	1642
1621	15.4	16.0	-.6	J	1657
1643	15.4	16.0	-.6	J	1654
1648	15.5	16.1	-.6	D	1710
1653	15.9	16.55	-.65	M	1738
1714	16.0	16.5	-.5	M	1814
1720	15.2	15.9	-.7	D	1805

COMPARISON BETWEEN A.R.T. AND BUCKET TEMPERATURES ON CROSSING POINTS

	2 Sept. USN a/c	3 Sept. RCAF a/c	4 Sept. USN a/c	All three days
Average diff.- ART-bucket	+0.140°C	−0.290°C	−0.304°C	−0.126°C
Standard deviation	0.233°C	0.241°C	0.226°C	0.230°C
No. of crossing points	40	27	35	102

TABLE 2.12

BT Instruments used during MILOC 64, Phase A TABLE 2.13

SHIP	BT No.	BT Type	BT DIPS NO.
MARIA PAOLINA	A_1	3	7-290
	C_1	3	539-616
	D_1	3	617-621
DALRYMPLE	B_2	3	26-114
	C_2	3	115-300
	E_2	3	582-614
JOAO DE LISBOA	A_3	3	16-59
	B_3	2	61
	C_3	3	62-270
SVERDRUP	A_4	3	1-50

Type 2 = 450 ft. BT.
Type 3 = 900 ft. BT.

MILOC 64

TABLE 5.1

Types and Locations of Meteorological Instruments

	DALRYMPLE	JOAO DE LISBOA	SVERDRUP	MARIA PAOLINA
Wind			Propeller type Elliott instrument at the masthead, 14.5 m above sea level.	Continuous recording anemometer; on the foremast, 18 m above sea level.
Air Temperature			Hand swung Assmann psychrometer; starboard beam, 2.5 m above sea level.	Assmann psychrometer with spring-driven motor; on the stern, 2 m above deck level and 6.5 m above sea level.
Solar Radiation	Moll-Gorczynsky thermopile protected by a glass dome, in connection with a Kent potentiometric recorder.	None	None	Bimetallic Actinograph, type Robitzsc-Fuess with protective cab, on the flying bridge 10.5 m above sea level.
Air Pressure			Aneroid barograph and aneroid barometer, 5.1 above sea level.	Aneroid barograph; on the bridge, 8 m above sea level.
Bucket Sample	Starboard or port beam		Starboard beam.	Starboard quarter.
Injection Intake	3 m below sea level	3 m below sea level	3 m below sea level	No records.

Daily Insolation during MILOC 64, Phase A

TABLE [illegible]

Date	Insolation in cal/cm² day as measured by DALRYMPLE	Insolation in cal/cm² day as measured by MARIA PAOLINA	Remarks
30.8.64	500	-	Between Liverpool and OWS KILO
31.8.64	495	-	
1.9.64	-	411	Between Lisbon and OWS KILO
2.9.64	> 310	322	
3.9.64	206	268	
4.9.64	293	247	
5.9.64	200	221	
6.9.64	166	157	
7.9.64	428	399	
8.9.64	326	260	
9.9.64	146	149	
1.10.64	223	187	
2.10.64	148	122	
3.10.64	-	108	

TABLE 5.3

KEY TO CODES USED

Cloud Types

0	Cirrus	5	Nimbostratus
1	Cirrocumulus	6	Stratocumulus
2	Cirrostratus	7	Stratus
3	Altocumulus	8	Cumulus
4	Altostratus	9	Cumulonimbus
x	Cloud not visible owing to darkness, fog, etc.		

Wave Directions

Add a zero to obtain direction (true) from which the waves are coming.

Air Pressure

Add 1,000 mb to figures less than 50; add 900 mb to figures greater than 50.

Visibility

0	<50 m	5	1 - 2 nm
1	50 - 200 m	6	2 - 6 nm
2	200 - 500 m	7	6 - 12 nm
3	500 - 1000 m	8	12 - 30 nm
4	1000 - 2000 m	9	> 30 nm

DALRYMPLE TABLE 5.3c

1	2		3		4			5	6
1	04	1530	4	6	1/3	5	24	16	8
		1600	4	8	1/3	5	24	16	8
		1700	4	8	1/3	5	24	15	8
		1730	4	8	1/3	5	24	15	7
		1800	7	8	1	6	23	15	6
		1830	7	8	1	6	22	14	6
		1900	7	8	2	5	22	14	5
		2000	7	8	1	5	24	14	5
		2130	7	8	1	5	24	14	5
		2200	7	8	1	5	24	14	5
		2230	7	8	1	5	24	14	5
		2300	7	8	1	5	24	13	5
		2330	7	8	1	5	23	13	5
	05	0001	7	8	1	5	23	13	5
		0100	7	8	1	5	23	11	5
		0130	7	8	1	5	23	11	5
		0200	7	8	1	5	23	10	5
		0230	7	8	1	5	30	09	5
		0300	7	8	1	5	30	09	5
		0330	7	8	1	5	36	09	5
		0400	7	8	1	5	35	09	5
		0500	5	8	1	5	34	09	6
		0530	5	8	1	5	32	09	6
		0600	6	6	1	5	26	09	6
		0630	6	4	½	5	24	09	7
		0700	3	4	½	4	24	10	7
		0730	3	7	½	4	24	10	5
		0800	3	8	½	4	25	10	6
		0900	3	8	½	4	22	11	7
		1000	3	8	½	4	23	11	7
		1030	6	7	½	4	24	12	7
		1100	6	7	½	4	24	12	7
		1200	3	6	½	5	24	12	7
		1305	3	7	½	5	29	12	7
		1330	3	8	½	5	29	13	7
2	05	1730	3	8	1	6	23	13	6
		1800	7	8	1	5	22	13	6
		1830	7	8	1	5	22	13	3
		1900	7	8	1	5	22	14	3
		1930	7	8	1	5	22	15	3
		2000	7	8	1	5	22	15	3
		2100	7	8	1	5	21	15	3

DALRYMPLE

1	2	3		4			5	6
2	05 2130	7	8	1	5	21	15	3
	2200	7	8	1	5	21	16	2
	2230	7	8	1	5	21	16	2
	2300	7	8	1	5	21	16	2
	2330	7	8	1	5	21	17	2
	06 0001	5	8	1	5	21	17	2
	0100	5	8	1	4	22	17	2
	0130	5	8	1	5	22	17	2
	0200	5	8	1	4	22	17	2
	0230	5	8	1	5	22	17	2
	0300	5	8	1	5	22	17	2
	0400	5	8	1	5	22	17	2
	0500	5	8	1	5	22	17	2
	0530	5	8	1	5	22	17	2
	0600	6	8	1	5	22	17	6
	0630	6	8	1	5	23	17	6
	0700	6	8	1	5	22	17	5
	0730	6	8	1	5	22	17	6
	0800	6	8	1	5	22	17	7
	0901	6	8	1	5	22	17	7
	0930	6	8	1	5	22	17	6
	1000	7	8	1	5	22	17	1
	1030	7	8	1	5	22	17	1
	1100	7	8	1	5	21	17	1
	1130	7	8	1	5	21	17	2
	1200	7	8	1	4	19	17	4
	1300	3	8	1	4	19	17	6
	1330	3	8	1	5	19	17	6
	1400	7	8	1	5	18	17	5
	1430	7	8	1	5	20	17	4
	1500	7	8	1½	6	20	17	4
	1530	7	8	1½	7	19	17	5
	1600	7	8	1	5	20	17	5
	1700	7	8	1	5	20	17	5
	1730	7	8	1	5	20	17	4
	1800	7	8	1	5	20	17	4
	1830	7	8	1	5	20	17	4
	1900	7	8	1	5	20	17	4
	1930	7	8	1	5	20	17	4
	2000	7	8	1	5	21	18	4
	2100	7	8	1	5	21	19	4

DALRYMPLE

TABLE 5...

1 LAP	2 DATE/TIME GMT	3 CLOUD Type	 Amount Octas	 Height m	4 WAVE Period sec.	 Dir.	5 PRESS. mb	6 VIS. Coded
1	02 1330	1/3	6	½	6	22	16	8
	1400	3	6	½	6	24	15	8
	1430	3	6	½	6	22	15	9
	1500	3	6	½	6	22	14	8
	1530	3	6	1	6	21	14	8
	1605	7	7	1	5	15	14	7
	1705	7	8	2	5	19	13	5
	1733	7	8	2	5	12	12	5
	1900	8	7	1 1/3	5	22	11	6
	1930	8	8	1 1/3	5	22	10	6
	2100	6	7	2	5	22	10	6
	2140	6	7	2	5	22	09	7
	2200	6	7	2½	6	22	09	7
	2230	0	2	3	6	22	08	7
	2300	0	2	3	6	22	08	7
	2330	0	1	3	6	22	08	7
	03 0105	3	6	2	6	24	07	6
	0135	3	6	2	6	24	07	6
	0230	3	6	2	6	27	07	6
	0300	3	6	2	6	27	07	6
	0400	3	5	2	6	28	07	6
	0500	7	6	1	5	28	08	6
	0530	-	5	2	4	28	08	6
	0600	7	7	1	3	31	07	6
	0630	8	6	2	6	30	07	7
	0700	8	6	2	6	30	07	7
	0730	4	7	2	4	29	07	7
	0900	5	8	2	6	24	07	3
	0930	5	7	2	6	24	06	3
	1000	5	8	2	5	24	06	4
	1030	7	8	2½	6	33	06	6
	1100	7	8	2½	6	33	06	7
	1130	7	8	2½	6	33	06	7
	1200	8	7	2½	6	35	07	6
	1230	8	6	2½	6	35	08	7
	1300	8	2	2½	6	35	09	8
	1330	8	3	2½	6	35	09	8
	1400	5	7	2½	6	35	10	6
	1430	8	7	2½	6	35	10	7
	1500	8	8	2½	6	3[illegible]	11	[illegible]

DALRYMPLE

TABLE 5.3b

1	2		3		4			5	6
1	03	1530	8	8	2½	6	35	11	6
		1600	7	8	2½	6	34	11	2
		1700	7	8	3	6	34	12	4
		1730	7	7	2½	6	34	12	7
		1800	5	8	3	6	34	12	6
		1830	5	8	2	6	35	13	7
		1900	5	8	1½	6	35	13	7
		1930	5	8	1	6	36	14	7
		2000	5	8	2	5	35	13	7
		2100	-	8	1	4	04	15	5
		2130	-	8	1	4	03	15	5
		2200	-	8	2	4	02	16	5
		2230	-	8	1	4	04	15	6
		2300	-	8	½	3	01	15	5
		2330	-	8	1	4	02	16	4
	04	0001	9	8	1/3	3	02	16	5
		0100	9	8	½	3	02	16	5
		0130	9	8	½	3	02	16	5
		0200	9	8	½	3	02	16	5
		0230	9	8	½	3	02	16	5
		0300	6	4	½	3	01	16	7
		0330	6	2	1/3	2	01	16	8
		0400	6	2	1/3	2	01	16	8
		0500	6	6	1/3	3	01	17	8
		0530	8	6	1/3	5	01	17	8
		0600	8	7	1/3	5	32	17	8
		0630	8	7	1/3	5	32	17	8
		0700	8	7	1/3	5	32	17	8
		0730	8	7	1/3	5	32	17	8
		0800	8	6	1/3	6	32	18	8
		0900	6	8	1/3	5	31	18	8
		0930	6	5	1/3	5	27	18	8
		1000	2	7	1/3	5	28	19	7
		1030	2	6	1/3	5	28	18	7
		1100	2	6	1/3	5	27	18	8
		1130	2	6	1/3	5	27	18	8
		1200	2	7	1/3	3	29	18	8
		1300	2	7	1/3	5	24	18	8
		1330	2	7	1/3	5	24	18	8
		1400	2	7	½	5	24	18	8
		1430	2	7	½	5	24	17	8
		1500	4	6	½	5	24	17	8

DALRYMPLE TABLE 5.3c

1	2		3		4			5	6
2	06	2130	7	8	1	5	21	20	4
		2200	7	8	1	5	21	20	4
		2230	7	4	1	5	21	20	5
		2300	7	4	1	5	21	20	5
		2330	5	2	1	5	21	20	5
	07	0001	6	2	1	5	21	20	5
		0100	6	2	1	5	21	20	5
		0130	6	2	1	5	22	20	5
		0200	6	2	1	5	22	21	5
		0230	6	2	1	5	21	21	5
		0300	6	2	1	5	21	21	5
		0330	6	1	1	5	22	21	5
		0400	0	0	½	4	21	21	6
		0500	-	1	½	4	21	20	5
		0530	6	3	1	5	20	20	6
		0600	3	4	1	4	21	21	6
		0630	3	4	½	4	22	21	6
		0700	3	6	1	4	21	21	6
		0730	0	4	1	5	22	21	7
		0800	0	3	1	5	23	22	7
		0900	8	6	1	5	25	23	7
		0930	8	5	1	5	25	23	8
		1000	8	5	1	5	24	23	8
		1030	8	4	1	5	24	23	8
		1130	0	5	1	5	24	23	8
		1200	0	5	½	4	22	23	8
3	07	1830	0	5	½	5	27	23	8
		1900	0	5	½	5	27	23	8
		1930	0	5	½	5	27	22	8
		2000	3	5	½	5	27	23	8
		2100	3	5	½	5	27	23	7
		2130	3	5	[illegible]	5	26	22	5
		2200	3	5	½	5	26	22	5
		2230	4	3	1/3	5	27	22	5
		2300	4	3	0	5	23	22	5
		2330	2	1	0	5	23	22	5
		2359	-	0	0	4	21	22	8
	08	0100	-	0	1/3	3	21	21	8
		0130	-	0	½	4	20	21	7
		0200	-	0	½	5	20	21	8
		0230	-	0	0	4	23	21	8
		0300	-	0	3/4	5	23	20	8

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DALRYMPLE TABLE

1	2		3		4			5	6
3	08	0330	-	0	1	5	21	20	8
		0400	-	0	1	5	21	20	8
		0500	7	8	1	5	21	19	7
		0530	7	8	1	5	21	19	7
		0600	7	8	1	5	24	19	7
		0630	6	1	3/4	5	24	19	8
		0700	6	5	½	4	24	19	8
		0730	0	1	½	4	23	19	8
		0800	0	3	½	4	23	18	8
		0900	8	6	½	4	23	17	8
		0930	8	5	½	5	24	17	8
		1002	0	3	1	6	24	17	8
		1030	0	3	1	6	25	16	8
		1100	0	2	1½	7	25	16	8
		1130	6	7	2	7	25	16	7
		1200	6	7	2	7	25	16	7
		1300	6	7	1½	7	26	16	7
		1330	6	7	1½	7	26	16	7
		1400	8	5	1½	7	26	16	7
		1435	8	5	1½	7	26	16	7
		1500	8	7	1½	7	26	16	7
		1530	8	7	1½	7	26	16	7
		1600	6	7	1½	6	26	14	7
		1700	6	8	1½	6	26	14	7
		1730	6	8	1½	6	25	14	7
		1800	6	8	1	6	26	14	7
		1830	6	8	1	6	26	14	7
		1900	6	8	1½	6	27	13	7
		1930	6	8	1½	6	27	13	7
		2000	6	8	1½	6	24	13	7
		2100	2	5	1	6	24	13	7
		2130	-	4	1	5	24	13	6
		2200	-	3	3/4	6	23	13	6
		2230	-	2	1	5	23	13	6
		2300	-	2	1	6	23	13	6
		2330	-	2	1	6	22	13	5
	09	0001	-	8	1	6	23	13	5
		0100	-	8	1	6	23	12	6
		0130	-	3	1	6	24	12	6
		0200	-	4	1	6	24	12	6
		0300	-	7	1	6	23	11	6
		0330	-	8	1	6	23	11	6
		0400	-	8	1	6	23	11	6

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DALRYMPLE

1			3		4			5	
3	09	0500	-	8	1	6	23	10	6
		0530	-	8	1	6	23	10	6
		0600	6	7	1	6	23	09	6
		0630	6	8	1	6	23	09	6
		0700	6	8	1	6	23	09	6
		0730	6	7	1	6	23	09	6
		0800	6	8	1½	5	24	08	7
		0900	6	8	1½	5	24	08	7
		0930	4	8	1½	5	24	08	6
		1000	4	8	1½	5	24	08	6
		1030	4	8	1½	5	24	07	6
		1100	4	8	1½	5	24	07	3
		1130	4	8	1½	5	24	07	1
		1200	5	8	1½	5	24	06	1
5	Oct. 01	1400	8	5	3	6	31	25	8
		1430	7	3	3	6	31	25	8
		1500	7	5	2	6	31	25	8
		1530	7	7	2	6	31	26	8
		1600	6	8	1	6	21	24	8
		1700	6	8	1	6	22	24	8
		1730	6	8	1	6	19	24	8
		1800	6	8	1	4	18	24	8
		1830	6	8	1	4	19	23	8
		1900	6	8	1	4	19	23	8
		1930	6	8	1	0	19	23	8
		2000	6	8	1	0	19	23	7
		2100	-	8	½	0	18	23	7
		2130	6	8	½	3	16	23	7
		2200	6	8	0	0	00	23	7
		2230	-	2	1	6	14	22	7
		2300	-	1	1	6	14	22	7
		2330	-	1	1	6	14	22	7
	02	0100	-	1	1	6	14	22	7
		0130	-	1	1	6	14	21	7
		0200	-	1	1	6	14	21	7
		0230	-	1	1	6	14	20	7
		0300	-	1	1	6	14	20	7
		0330	-	1	1	6	14	19	7
		0400	-	1	1	6	14	18	7
		0500	-	1	1	6	15	18	7
		0530	-	1	1	11	11	18	7

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[redacted]

DALRYMPLE

TABLE 5.3h

1	2		3		4			5	6
5	02	0600	6	8	1	11	11	18	7
		0630	6	8	1	11	11	18	7
		0700	6	8	½	11	17	18	7
		0730	6	7	½	11	17	18	7
		0800	6	7	1	3	17	18	7

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